ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

OCT 30 1998

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of	)	
	)	
Amendment of Part 95 of the Commission's	)	WT Docket No. 98-169
Rules to Provide Regulatory Flexibility in the	)	RM-8951
218-219 MHz Service	)	
	)	
Amendment of Part 95 of the Commission's	)	WT Docket No. 95-47
Rules to Allow Interactive Video and Data	)	RM-8476
Service Licensees to Provide Mobile Services	)	(proceeding terminated)

COMMENTS OF COMMUNITY TELEPLAY, INC.

Community Teleplay, Inc. ("CTI") hereby submits its comments in the captioned proceeding pursuant to the Commission's Order, Memorandum Opinion and Order and Notice of Proposed Rulemaking, FCC 98-228, released on September. 17, 1998 [hereinafter "NPRM"].

I. Introduction

1. CTI is the Segment B licensee in the 218-219 MHz service for the Norfolk-Virginia Beach MSA. CTI, a small business, acquired its license at an FCC-conducted auction in 1994. CTI's principals have devoted substantial resources to the development of its 218-219 MHz service. After persistent effort, CTI has arrived at the point of deploying an initial 218-219 MHz system in Norfolk that will provide automatic vehicle tracking and other wireless data services.

2. CTI's experience should provide some guidance for the Commission and other 218-219 MHz licensees in determining the future of the 218-219 MHz service. CTI believes that the Commission should adopt rules that provide strong incentives for licensees to commit resources to the development of the 218-219 MHz spectrum. CTI proposes construction benchmark and

substantial service rules for that purpose. In these comments, CTI will also show how the Commission can revise certain technical rules and improve the 218-219 MHz service. CTI will also show why the Commission should, contemporaneously with this rulemaking, resolve pending cases concerning: (i) 25% refunds to the "non-preferred" class of auction winners that did not receive race/gender preferences in the 1994 auction; and (ii) the ability of 1994 auction winners to submit grace period requests. These comments will also address other proposals contained in the Commission's NPRM concerning legal and regulatory status of 218-219 MHz licensees.

II. Background on Community Teleplay, Inc.

3. CTI was founded in 1993 as "Community Teleplay Partners," a general partnership formed by Richard S. Myers, a communications attorney, and James J. Keller, a communications engineer. The company was incorporated as Community Teleplay, Inc. on June 24, 1994. In its first year, CTI acquired authorization from the Commission to construct and operate a low power television ("LPTV") station on UHF Channel 45. The LPTV station has been on the air since 1996, broadcasting infomercials. All of the revenues from LPTV operations have gone to cover CTI's expenses, including the acquisition of 218-219 MHz equipment and development of its wireless data services.

4. At a July, 1994 auction conducted by the Commission, CTI acquired a license for what was then called the Interactive Video and Data Service (renamed by the Commission as the 218-219 MHz Service) for the Norfolk-Virginia Beach MSA. At that time, CTI's business plan called for integrating 218-219 MHz and LPTV facilities to provide interactive television ("ITV") services in the MSA using equipment developed by EON Corporation ("EON"). CTI worked with EON to

develop a business plan based on EON's ITV technology. Later, CTI also worked with Welcome To The Future, another company attempting to develop ITV using 218-219 MHz frequencies.

5. In 1996, following the lack of progress in bringing ITV service to fruition using a 218-219 MHz network service, CTI switched gears. It began focusing on wireless data applications using the 218-219 MHz spectrum. In December, 1997, at a technology show held in the Norfolk-Virginia Beach MSA, CTI rented a booth to demonstrate vehicle tracking service over the 218-219 MHz spectrum using equipment made by Gateway Communications, Inc. ("Gateway"), a company based in Tucson, Arizona. At the technology show, CTI was introduced to one of the show's sponsors, Virginia's Center for Innovative Technology ("VCIT"). Later, VCIT matched CTI with a company having a need for a system to track its vehicles. In April, 1998, CTI constructed a 218-219 MHz cell site in the MSA, and demonstrated vehicle tracking to the company introduced to CTI by VCIT. That company later agreed to have vehicles equipped with mobile RTUs for purposes of testing the 218-219 MHz system that CTI is deploying in Norfolk (the "Norfolk System").

6. The vehicle tracking service over CTI's 218-219 MHz network works as follows. The cell sites are known as cell transceiver stations ("CTSs"). The devices installed in the vehicles are called remote transceiver units ("RTUs"). In essence, CTSs and RTUs are two-way radio modems that send data back and forth over the 218-219 MHz spectrum. The RTUs transmit the vehicles' location (received from the Global Positioning System) to a CTS cell site over CTI's 218-219 MHz frequency. The CTS relays the information to CTI's System Hub which delivers it to the customer's personal computer ("PC"). The PC displays a computerized street map with moving vehicle icons that show the driver's location every 10-15 seconds. The CTS can also transmit requests to the RTUs to send information.

7. VCIT also introduced CTI to Old Dominion University's Technology Applications Center ("TAC"). As part of the buildout of the Norfolk System, TAC has assisted CTI in performing a study to determine whether mobile RTUs can be operated at higher powers without increasing the potential for harmful interference to other spectrum users. In October, 1998, CTI obtained an experimental license from the FCC to conduct such testing. Initial test results are submitted with these comments, demonstrating that higher power mobile RTUs do not increase the potential for harmful interference.

8. CTI has established an Operations Center ("OC") in Norfolk at which its System Hub will be located. The OC is situated on the campus of Old Dominion University ("ODU"), close to the offices of both TAC and the company that is using CTI's vehicle tracking system. The proximity of CTI's OC has facilitated its joint work with TAC and the system user. CTI currently projects that it will have in excess of 5,000 vehicles on the system by the year 2002.

9. Other applications for CTI's 218-219 MHz network are in various stages of development. The network can transmit signals to and from an RTU attached to a business or residential utility meter. An automatic meter reading ("AMR") device could calculate the total units of energy used from meter measurements, then transmit this information to a 218-219 MHz base station for relay to the utility company. AMR systems can include water, gas, electricity, and any other household service billed through a meter system. AMR is a "fixed" application compared to AVL which is "mobile" application. This difference highlights a major attribute of CTI's wireless data network, namely that it can provide a variety of "fixed" and "mobile" services simultaneously. A utility company, for example, could use CTI's network for both AMR and vehicle tracking.

10. CTI's planned AMR network configuration based on 218-219 MHz technology assumes that the utility meters will be "retrofitted" to transmit data over an unlicensed "shared spectrum" path (e.g., 900 MHz) to a nearby data collector which, for example, could be mounted on a light pole. The data collector, via an interface device, is connected to an RTU mounted on the same pole. The RTU transmits the data to a CTS for further distribution over the network and to the customer's premises.

11. For vending machine monitoring, an RTU is connected to a device that collects data from a vending machine, such as the amount of each type of item sold and the supply of each item remaining in the vending machine. The RTU transmits the data over the network to the customer's premises. The same network could be used by the customer to track the vehicle along the supply route. The driver would know the amount of product to be delivered to each vending machine on the route based on the data sent from the machine's RTU. A possible enhancement would use mobile data terminals to inform the driver in real time of the exact amount and type of product required by the machine at the next stop.[1]

12. CTI is implementing specific business and marketing plans and strategies for building a customer base for its wireless data services. CTI has spent many hours in its MSA developing relationships with potential customers of its wireless data services. What CTI has learned in its five years of experience is that development of 218-219 MHz services takes a lot of time and commitment. What it does not require, however, compared to other wide-area wireless network systems, is huge amounts of money to deploy a system. In fact, the low buildout costs of the 218-219

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[1] CTI understands that Eon Corporation is developing a vending machine monitoring application for the 218-219 MHz spectrum.

MHz system CTI is deploying is one of the competitive advantages it enjoys. CTI currently estimates buildout costs at a fraction of a cell site of competing narrowband and broadband wireless systems. Moreover, CTI has arrangements in place with two leasing companies for equipment financing, and has already arranged enough lease financing to cover the initial buildout of a large portion of its MSA.

13. Further, CTI has found that the Commission's current technical rules governing 218-219 MHz do not prevent system deployment. CTI has constructed and deployed a 218-219 MHz system that complies with current rules. Certainly there can be rule changes that will significantly improve the 218-219 MHz service, and CTI strongly urges the Commission to adopt those changes. But CTI's experience is proof that the current technical rules are not an obstacle to constructing 218-219 MHz systems.

14. Equipment for 218-219 MHz systems has been manufactured over the years by several companies in addition to Gateway. CTI contacted companies that received FCC type acceptance for such equipment in an attempt to determine why licensees had not ordered more equipment from them.[2] Some of the manufacturers indicated that 218-219 MHz licensees were mere speculators who did not understand the spectrum they had acquired. Some indicated that the lack of applications development resulted in the lack of equipment sales. One company indicated that the equipment it did sell was used merely to meet FCC construction benchmarks.

15. CTI submits that it is probably true that the development of commercially viable applications leads to the development of equipment to go with them. But 218-219 MHz equipment

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[2] These companies include GLB Electronics, Eon Corporation, SEA Incorporated, Signal Science Incorporated, Radio and Telecom & Technology, Berkeley Varitronics Systems, and Welcome To The Future. CTI encourages these companies to comment on CTI's research and the conclusions it has drawn.

manufacturers and application developers need licensees buying, deploying, and testing equipment and applications and building customer bases for services, building 218-219 MHz networks into commercially viable businesses. Once some commercially-viable equipment and applications are available on commercially reasonable terms, licensees should have no reason not to purchase it, deploy it, and market it to customers.

16. Furthermore, 218-219 MHz systems do not require a "national footprint." CTI's current business plan is based solely on local applications in its MSA. CTI counts current expressions of interest in its vehicle tracking service on the order of 1,000 vehicles based on responses from exhibiting at one technology show in the market and constructing its initial system in Norfolk. CTI predicts that there are very few MSAs for which a service network expanding beyond a licensee's own MSA borders is necessarily required for success.

17. At the same time, as CTI's business expands, it will certainly be helpful and a benefit for 218-219 MHz customers for adjacent markets to build systems that allow roaming for mobile applications such as vehicle tracking. The Commission should adopt rules that provide a strong set of incentives for such buildout to occur.

III. Proposed Rules for Lottery Licensees

18. **Service and Construction Requirements**. Lottery licensees are key to the success of the 218-219 MHz service. Covering the top 9 MSAs, these licensees are responsible for providing 218-219 MHz services to a large portion of the U.S. population.[3] Without meaningful buildouts in the top nine markets, 218-219 MHz equipment manufacturing and application development will be

[3] The top 9 MSAs are New York, Los Angeles, Chicago, Philadelphia, San Francisco, Dallas, Boston, Houston and Washington, D.C.

slowed, creating a drag on the deployment of systems in the lower tier markets resulting from higher equipment and development costs. These higher costs for system deployment are borne by the auction winners who, unlike the lottery winners, have already invested cash by buying their licenses.

19. The Commission acknowledged at paragraphs 42-43 of the NPRM that it is mandated to promote the rapid deployment of new technologies and services by means of performance requirements, such as deadlines and penalties for performance failures, and that it therefore did not believe all construction benchmarks should be eliminated. The best way to fulfill that mandate for the 218-219 MHz service is to retain the current five year construction benchmark for the lottery winners and not eliminate it at this time. There are signs that other 218-219 MHz equipment manufacturers and applications developers in addition to Gateway are nearing the point of making commercially viable products available, if they have not already done so. The proposal to eliminate the current 5-year construction benchmark and permit lottery winners another 5 years to provide "substantial service" will create a serious setback to the development of the 218-219 MHz service. If such a rule is put into place, CTI predicts that many if not nearly all of the lottery winners will simply wait another five years -- to wait and see which equipment applications are the best -- before constructing systems. Such an outcome will cause serious harm to all serious players in the 218-219 MHz service.

20. The Commission should determine whether commercially viable equipment is available at the time of the 5-year benchmark and, if it is, it should grant extensions of time for lottery winners to construct systems meeting the benchmark on a case-by-case basis upon a showing of substantial

progress.[4] The Commission could announce "safe harbor" provisions in advance that would justify such extensions -- such as executed equipment purchase orders and site leases.[5] Once the lottery licensee met the benchmark, it would be eligible for a 5-year renewal of its license. The 5-year renewal would require the licensees to provide "substantial service" within one year of renewal and coverage to at least 50% of its market (population or area) within two years of renewal. The license would cancel if either renewal benchmark was not met. "Substantial service" should be defined as "service to at least one customer (unaffiliated with the licensee) that is sound, favorable, and substantially above a level of mediocre service, which would barely warrant renewal."[6] The safe harbors described at paragraph 45 of the NPRM should also be adopted. The Commission could grant extensions (but should not grant across-the-board waivers) of these benchmarks on a case-by-case basis on a showing of substantial progress. At the end of the 5-year renewal period, unserved areas would be opened to competing applications.

21. The purpose of such rules is to provide lottery winners in the highly important top 9 MSAs with strong incentives to actively pursue meaningful buildout and development of the 218-219

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[4] If the Commission makes a reasoned determination that such equipment is not available, it can make a reasonable decision at that time as to the appropriate length of time for a benchmark extension. CTI believes, however, that information presented during the course of this rulemaking proceeding will demonstrate that equipment will be available to meet the five-year construction benchmark for lottery winners. CTI's own experience with its Norfolk system supports that conclusion.

[5] The "substantial progress" criteria for construction extensions is the approach the Commission has taken in the broadcast services. CTI sees no reason why a similar approach should not be taken with respect to the 218-219 MHz service.

[6] CTI believes it is important to include the unaffiliated customer as part of the "substantial service" definition to help ensure sincere and bona fide buildouts, and not the kind of construction intended merely to save the license.

MHz service. If such measures are not taken, development of the 218-219 MHz service in the top nine markets will continue to languish, creating a drag on the entire industry. This service simply cannot afford a passive, slow group of licensees covering the major markets of the country.

22. As the NPRM notes at paragraph 35, the original five-year license term was intended to discourage trafficking of lottery-won licenses. The lottery winners should continue to be discouraged from pursuing "trafficking" strategies. They should be encouraged to pursue sincere buildout strategies by requiring them to meet construction benchmarks as a condition for renewal. In this regard, CTI respectfully disagrees with the Commission's statement at paragraph 36 of the NPRM that lottery and auction licensees face "the same competitive setting and opportunity costs going forward" and thus should all have extended 10-year license terms. Nothing could be further from the truth. The auction winners face much higher costs going forward due to their license debt burden. For that reason alone the auction winners are at a substantial competitive disadvantage in their markets compared to the competitive setting the lottery winners find themselves in. For example, cellular carriers with whom 218-219 MHz licensees can expect to compete in providing data services did not have to pay for their licenses at auction. The 218-219 MHz lottery winners will be on an equal footing with such competitors in their market because they, too, did not have pay for their licenses at auction. Unlike the auction winners, the lottery winners do not have to raise funding and revenue to cover license payments but can devote those resources to buildout and competing with other carriers. The lottery licenses should not be automatically extended to 10 years. Instead, a 5-year renewal of such licenses should be granted only after construction benchmarks have been met. Subsequent "substantial service" benchmarks should be required to be met during the renewal period.

23. **Anti-Trafficking Rule.** The Commission should retain the current anti-trafficking rule governing the award of licenses by lottery, and not permit any type of transfer, assignment or sale to any other entity until the five year (50 percent coverage) construction benchmark has been met. As stated previously, CTI's position is that the current five year benchmark should not be waived if commercially viable equipment is available at that time, and extensions of time to construct should be granted only on a case-by-case basis upon a showing of substantial progress. Extensions of construction benchmarks should not be granted so that a licensee can assign its license. If an existing lottery licensee does not wish to construct a 218-219 MHz system and develop a business, it should turn in its license, or the Commission should cancel the license, and the MSA submitted to competing applications and competitive bidding. Public auctions -- not private sales -- of the licenses in the top 9 market constitute the best means for assuring that those licenses gets into the hands of those who value it the most and will actually work to develop the 218-219 MHz service.

IV. Proposed Rules For Auction Licensees

24. **Service and Construction Requirements**. Auction winners have an additional year to meet the current 5-year construction benchmark. That benchmark should be retained, and extended on a case-by-case basis following clear "safe harbor" provisions that define "substantial progress." At the same, because auction winners paid for their licenses and many did so on the installment plan, it makes sense for the Commission to extend the current license term to 10 years to permit restructuring of payment schedules. Auction winners should be subject to the substantial performance benchmark at year 6 of the extended license term, with license cancellation the consequence for not meeting the benchmark. Any areas unserved by the auction winners at the end of the extended term would be open to competing applications. Auction winners that do not wish

to be subject to these rules should be allowed to return their licenses to the Commission with amnesty.

25. **Reamortization of Installment Payment Debt and Financing Options.** CTI generally supports the Commission's proposals at paragraphs 37-39 of the NPRM with changes. The Commission suggests that a licensee's installment payments be recalculated using a ten year schedule, interest only for years 1 and 2, and principal and interest amortized over the remaining eight years. Unfortunately, since installment payment licensees will be in year 5 of this ten year payment term when payments resume, this will result in these licensees being forced to make a substantial installment payment once payments resume.[7] This payment will be required at the time when the licensee most requires cash to construct a system and attract customers. Therefore, CTI proposes that once installment payments resume, the payments should be interest-only for the first six months and principal and interest amortized over the remaining term of the license. Since installment payment licensees have already made a 10% downpayment and some interest-only payments, they clearly have a vested interest in deploying a system, especially if the Commission adopts CTI's suggestions regarding construction benchmarks.

26. **Need To Resolve Pending Cases.** CTI respectfully suggests that the Commission resolve prior to or contemporaneously with the adoption of rules in this rulemaking two pending cases which have significant impact on installment payment issues. The first case deals with whether the Commission should refund 25% of the winning bids of the 1994 auction winners who were not in the class of bidders receiving race/gender preferences. The second case deals with whether the

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[7] Depending on when payments do resume, this could amount to as much as 40-50% of the sum of all of a license's installment payments.

Commission should retain prior rules that permit installment payment licensees to request grace periods.

27. The 1994 Bidders' Case. The Commission adopted rules for the 1994 auction which gave minority and women-owned business, among other things, a 25% bidding credit.[8] The bidding credit resulted in minorities in the preferred class (i.e., those who received a bidding credit) receiving a 25% credit off their winning bid while members of the non-preferred class (i.e., those who did not receive a bidding credit) were required to pay the entire amount of their winning bid.[9] Subsequently, the Supreme Court held that the federal government can not award race or gender-based preferences, because this practice violates the equal protection clause of the Fifth Amendment to the Constitution.[10] The Commission has since found that the race/gender based preferences used in the 1994 auction were unconstitutional in light of Adarand and VMI and has eliminated them from its rules.[11]

28. Following Adarand, various IVDS licensees in the non-preferred class, including CTI, requested that the Commission give the non-preferred class a 25% refund or credit with respect to

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[8] In the Matter of Implementation of Section 309(j) of the Communications Act -- Competitive Bidding, PP Docket No. 93-253, Fourth Report and Order, 9 FCC Rcd 2330 (1994).

[9] See CTI et al. Supplement to Petition for Relief at 3-4 (filed January 12, 1998) [hereinafter Supplement].

[10] Adarand Constructors, Inc. v. Pena, 115 S. Ct. 2097 (1995); United States v. Commonwealth of Virginia, 116 S. Ct. 2264 (1996) [hereinafter VMI].

[11] In the Matter of Implementation of Section 309(j) of the Communications Act -- Competitive Bidding, PP Docket No. 93-253, Tenth Report and Order, 11 FCC Rcd 19974, 19976 (1996).

the license payments due to the uconstitutional bidding preferrence applied in the 1994 auction.[12] The Commission rejected Graceba's claim that was initially filed in July 1995. However, on appeal, the United States Court of Appeals for the District of Columbia Circuit on June 20, 1997, remanded Graceba's case back to the Commission for consideration of its constitutional claim.[13] The coalition of licensees filed its petition on December 6, 1995, which the Commission denied on May 28, 1998.[14] An Application for Review of that denial is currently pending at the agency. The Commission should grant the non-preferred class a 25% refund or credit, whichever is applicable, because administrative finality does not bar the retroactive application of Adarand and VMI.[15] Further, failure to provide the non-preferred class with an effective remedy will perpetuate an unlawful taking by the Commission.[16]

29. CTI respectfully suggests that Commission address the bidders' case in the instant rulemaking, since it relates to installment payments. The D.C. Circuit also stated, in its order remanding Graceba's case, that the Commission consider the interests of auction participants not

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[12] The petitioners include Graceba Total Communications Inc. and a coalition of licensees consisting of CTI, TV-Active, L.L.C., Texas Interactive Network, Inc., Hispanic & Assocs., Zarg Corp., IVDS Interactive Acquisition Partners and G. Ray Hale.

[13] Graceba Total Comm. Inc. v. FCC, 115 F.3d 1038 (D.C. Cir. 1997).

[14] Community Teleplay Inc., 13 FCC Rcd 12426 (WTB 1998).

[15] See Supplement at 8-12; CTI et al. Application for Review at 17-18 (filed June 29, 1998) [hereinafter Application].

[16] Supplement at 3-8; Application at 13-17.

represented.[17] If this case is resolved after rules are adopted, the Commission and auction licensees could very well be faced with the prospect of having to restructure installment payments yet again.

30. The Grace Period Rule Case. On December 31, 1997, the Commission released an order eliminating grace period requests in favor of two 90-day automatic grace periods.[18] CTI filed a petition for reconsideration of that order on January 30, 1998, arguing that the Commission's unilateral modification of payment terms in financial agreements with licensees making installments payments constituted impermissible retroactive rulemaking.[19] Therefore, the amendment of the grace period rules cannot apply to licensees under installment payment programs prior to implementation of the new rule. CTI respectfully suggests that the Commission attempt to resolve this case prior to or contemporaneously with the adoption of rules in this rulemaking. This case has the potential of impacting all auction winners on the installment plan. Sincere licensees are attempting to raise capital and develop 218-219 MHz services. Those efforts would be aided by the certainty of a resolution of this case that would be conveyed to investors and lenders.[20]

V. Rules Applicable To Both Lottery And Auction Licensees

31. **Service and Technical Rules**. CTI retained the Technology Applications Center ("TAC") of Norfolk and the Engineering Department of Old Dominion University ("ODU") to assist

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[17] Graceba 115 F.3d at 1042.

[18] In the Matter of Amendment of Part 1 of the Commission's Rules -- Competitive Bidding Procedures, WT Docket No. 97-82, Third Report and Order, 13 FCC Rcd 374 (1997); 47 C.F.R. § 1.2110(f) (1998).

[19] CTI Petition for Reconsideration at 5-11.

[20] CTI wishes to emphasize that it is only respectfully suggesting that the two cases be resolved prior to or contemporaneously with rules adopted in this proceeding as a way of helping the development of the 218-219 MHz service.

CTI in conducting tests to determine whether 1 watt mobile RTUs operating with no duty cycle pose any significant potential for interference to the reception of television channel 13. On October 15, 1998, CTI received experimental license authority from the Commission to conduct such tests. Although given a short period of time between that date and the date of filing these comments, TAC/ODU was able to complete a preliminary study.[21] As detailed below, the TAC/ODU study indicates that 1 watt mobile RTUs operating with no duty cycle do not pose an interference issue for TV Channel 13. CTI will submit further test results once more extensive data has been gathered.

32. Operation of 1 watt mobile RTUs. The TAC/ODU study shows that the 100 milliwatt power limit on mobile RTUs is unnecessarily low. The study clearly demonstrates that outdoor mobile 1 watt RTUs located in the Grade B contour of TV channel 13 and fifteen feet from a residence with no obstructions do not cause interference to the reception of TV channel 13. This result is not surprising. If a fixed 1 watt RTU placed on top of TV set is not considered an interference problem in the Grade B contour of channel 13, there should be even more reason not to expect mobile 1 watt RTUs that are located outside, much further away from television receivers, to cause interference. The TAC/ODU study confirms this conclusion

33. The TAC/ODU study identifies several factors supporting that there is a very low potential for interference from mobile RTUs operating at 1 watt. These factors include automatic power control which limits the transmitting power to the minimum that is necessary, and the amount of time for each transmission is very low. The study further notes that most television receivers or antennas are not located close to streets and highways where an RTU will pass close by and will have a small chance of experiencing any problem since the vehicle will move quickly away. In weaker TV

[21] A copy of the TAC/ODU study is submitted as Attachment B.

signals, it is reasonable to assume viewers (not connected to cable TV service) will install better, high gain antennas that substantially reduce the chance of interference. Moreover, several remedies are available to eliminate any interference that may occur, such as attaching simple filters to TV receivers.

34. The Commission therefore should adopt a new rule that allows mobile RTUs to operate outside a residence anywhere at 1 watt. The Commission should also entertain waivers to permit mobile RTUs to operate at powers higher than 1 watt upon a technical showing of no interference.[22]

35. Duty cycle. Originally, the 218-219 MHz service was envisioned as one enabling ITV applications using an RTU device placed on a television set. The five second duty cycle was intended to protect against interference to television reception of channel 13. The TAC/ODU study concluded that a mobile RTU transmitting at 1 watt without a duty cycle outside a residence in the Grade B contour of Channel 13 will cause no significant interference to television reception. CTI submits that the rules should thus allow mobile units whose main function is to operate outside a residence to operate without the limitation of a duty cycle. Only units placed on a television should be required to maintain a duty cycle.

36. Automatic Power control capability. The TAC/ODU study indicates that automatic power control reduces even further the possibility of interference to Channel 13 caused by mobile 1 watt RTUs transmitting without a duty cycle. CTI thus believes that the Commission should retain the current automatic power control requirement. Such a requirement will also reduce the possibility of interference between co-channel 218-219 MHz licensees in adjacent markets.

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[22] CTI believes that additional interference protection of up to 25 dB can be obtained using "stub" filters.

37. Antenna height and transmitter power limitations. The TAC/ODU study found that a fixed, 5 watt RTU produced no noticeable interference to a television set tuned to channel 13 until the RTU antenna was placed closer than approximately 11 feet from the receiver. The undesired-to-desired signal levels were approximately 30 dB apart with no interference observed. CTI thus proposes that licensees be permitted to operate CTSs at any height and power as long as the power remains no more than 30 dB from the signal strength of the Channel 13 contour in which it is located.

38. Regulatory Status and Permissible Communication. CTI supports the Commission's proposal to provide licensees with the choice of being regulated as private or common carriers as proposed at paragraphs 32 through 34 of the NPRM. CTI urges the Commission to take an open and flexible approach in permitting any and all kinds of existing and new services that can be offered over 218-219 MHz networks as long as they comply with the Commission's technical rules and cause no interference to other services.

39. Spectrum Aggregation. CTI believes it makes sense for the Commission to permit common ownership of Segment A and Segment B licenses in the 218-219 MHz service, but not in the lottery markets, at least construction benchmarks have been satisfied by both Segment A and B licensees. Those MSAs are critically important to the long term success of the service and will play an important role in the near term as commercially viable equipment becomes available. The market for this equipment should be maximized by not permitting Segment A and Segment B combinations, thus preserving 18 different buyers for 218-219 MHz in the top 9 MSAs (two buyers per market). If such combinations are permitted, there could be only half that number of potential buyers, thus stunting equipment sales and deployment. In contrast, there are a much greater number of lower tier

auction markets most of which have smaller demographics than the top 9, factors which support permitting Segment A and B licensees to combine.

40. In CTI's view, the 500 Khz of spectrum allocated to each 218-219 MHz licensee provides sufficient capacity for a commercial viable business. CTI's current plans accommodate five different applications using 500 Khz of spectrum. With low cost equipment available, CTI will be able to sectorize cell sites as traffic on its network grows. CTI believes it will be able to accommodate thousands of vehicles for tracking services as well as thousands of meters for automatic meter reading services, plus other applications, all at the same time using 500 Khz of spectrum. This is not to say that system capacity will be unlimited. A 218-219 MHz licensee could very well require the other frequency segment as the service expands. For that reason, common ownership of both segments should be permitted for the auction winners. But such aggregation, in CTI's view, is not a necessary condition that must be allowed now in order for the 218-219 MHz to become viable. For that reason, common ownership of both segments should not be permitted for the lottery winners until they each build and develop systems using the 500 Khz of valuable spectrum they each won at a lottery.[23]

41. Partitioning and Disaggregation. As it does for other services, the Commission should permit partitioning and disaggregation for the 218-219 MHz service. Based on its experience with equipment and applications developers in the 218-219 MHz service, CTI believes that it is possible to divide and allocate a licensee's authorized 500 Khz of spectrum for different purposes.

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[23] The Commission requested at paragraph 50 of the NPRM information about what other technologies provide, or may in the future provide, comparable services to those currently provided or proposed for the 218-219 MHz spectrum. CTI is reluctant to go into great detail for competitive reasons, but generally any narrowband or broadband wireless system conceivably could provide at least some of the fixed or mobile services provided by 218-219 MHz systems.

Geographic partitioning should also be allowed based on any area defined by the parties within the licensee's service area, as proposed at paragraph 51 of the NPRM.

42. CTI agrees with the Commission's proposal to permit parties to a partitioning of a license in the 218-219 MHz Service to have the same flexibility in meeting construction requirements that licensees in other services enjoy.

43. The Commission requested, at paragraph 52 of its NPRM, comments on its tentative conclusion that permitting partitioning and disaggregation would remove potential barriers to entry by small businesses, encourage parties to use spectrum more efficiently, and speed service to the public. CTI believes a likely scenario (if there is one) for partitioning or disaggregation would be where a large business desires to acquire a portion of a licensee's spectrum for its own internal purposes. It seems less likely to CTI at this time that it would be a small business that acquires a partitioned license although that of course is possible, and should be permitted. But CTI wishes to emphasize that there are much more important ways, addressed in other sections of these comments, that the Commission can encourage the small businesses who are already 218-219 MHz licensees to now begin to actually enter the wireless data business by building systems and bringing services to the public.

44. **Incorporation by Reference of Part 1 Standardized Auction Rules**. CTI generally supports the Commission's proposal at paragraphs 56-57 of the NPRM to follow standardized auction rules for future 218-219 MHz auctions, with certain changes. The 218-219 MHz service has been slow to develop for reasons described in these comments. The Commission could give this service a substantial boost by awarding a "construction preference" in future auctions to existing 218-219 MHz licensees that have met construction benchmark and substantial performance requirements

in a market adjacent to the one for which it is bidding. The 218-219 MHz auction participant would certify its eligibility for the construction preference on its short form application. The preference should be a 35% bidding credit, in addition to any other credit for which it may be eligible. Such a construction preference would spur the development of 218-219 MHz services, especially those that are mobile services whose value will be increased by expansion into adjacent markets, and it is exactly the sort of incentive that the 218-219 MHz service needs given its slow pace of development.

45. In adddition, CTI agrees with the Commission's proposal to retain the two tiers of small business size standards currently set for 218-219 MHz Service licensees. This Service is truly one for the small business; accordingly, the business size standards should remain at their low levels to prevent businesses that might be considered small in a broadband service from taking advantage of the bidding credits.

Respectfully submitted,

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ATTACHMENT A

Old Dominion University
College of Engineering and Technology

Absence of Interference To TV channel 13 From Mobile Transmitters Operating At 218-219 MHz

October 23, 1998

Summary

Calculations indicate that signal levels associated with RTU mobile operation will not cause significant interference to television reception. No noticeable interference was observed when RTUs were transmitting at 1 watt with no duty cycle in the near vicinity of a TV receiver. Mobile and cell operation, including output power control, will result in very short duration of any conditions that may possibly be a problem. Remedies, such as filters and antenna changes, can be applied to any unusual cases.

Professor A M Blischak
Dept of Engineering Technology
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The information and calculations within this document are in support of the request to operate mobile RTU transmitters up to 1 watt with no duty cycle in the Norfolk MSA. No significant interference to TV channel 13 within the Contour B signal area will result from operation at 1 Watt and below with no duty cycle.

From the OST Technical Memorandum, *Guidance For Evaluating The Potential For Interference To Tv From Stations Of Inland Waterways Communications Systems*, July 1982, a receiver protection ratio of -17 dB was recommended for transmitters in the 217.5 to 218.0 MHz range. Extrapolating to 218.5 to 219.0 gives a value of approximately -25dB for a protection ratio of desired-to-undesired signal power for TV channel 13.

The -25dB protection ratio figure agrees with the earlier report, *Interference To TV Channels 11 And 13 From Transmitters Operating At 216 and 225 MHz, Project No. 2229-71*, October 7, 1975. Receiver design has advanced substantially since this report was done. Much higher required protection ratios can be anticipated today because of new IF filtering devices, and RF front-end designs using SAW filters and transistors that produce much lower intermodulation distortion. Since it will be shown that even the older lower protection ratios can be met, an extensive investigation of currently available receivers may not be necessary.

From the signal calculations in Appendix A for the worst case condition, the minimum power to a receiver with "rabbit-ear" antenna is calculated to be -65 dBm. This assumes that the rabbit-ear antenna has the aperture of a dipole, receiving a signal at the minimum Contour B level of -59dBμ. While another antenna arrangement may result in stronger interfering signal strength, the ratio of desired-to-undesired signal will remain the same, or as discussed later, can get better. These considerations are eliminated since both signals will increase, and thus the ratio of signals is maintained.

Calculating the power produced from the RTU unit at 100 meters, a value of -37 dBm was obtained. Typical RTU operation is 1watt maximum, into a 1/4 wave vertical antenna with an approximate efficiency of 80%. These are considered worst case conditions and, under typical operation, should seldom occur. Even at this level of undesired signal, the protection ratio is the difference of desired to undesired, or approximately 29 dB.

These results were quickly verified when an RTU operating at 1 watt was observed to produce no noticeable interference on a portable TV set, tuned to channel 13 when the vehicle-mounted RTU antenna was approximately 15 feet from the TV receiver. A Radio Shack 10 inch color television using an off- the-shelf "rabbit ears" antenna was placed inside a single story wood framed house. An RTU with an antenna mounted on the roof a vehicle was placed outside, with line of sight visibility to the television receiver at a distance of approximately 15 feet. An HP ESA-L1500A portable Spectrum Analyzer using HP E4444A Bench Link Software and connected to a 1/4 wave vertical antenna was used to record the actual signal strength and signal characteristics. The antenna of the spectrum analyzer was placed on top of the television set being viewed. Placed near the TV receiver, the undesired-to-desired signal levels on the display were approximately 30 dB apart with no interference observed. While even the calculated results are acceptable, the quick measurements were very encouraging.

Several other things related to the RTU operation will substantially reduce the already low interference potential. The normal operation of a cell communication structure requires minimum necessary transmitter power from each operating RTU in order to maintain cell integrity. Automatic power control is implemented and will be used, reducing the possibility of interference even further. Also as part of the Cell operation, the RTU only transmits when polled. The amount of time actually transmitting is very small, resulting in a very low duty cycle for each transmission.

Most TV receivers or antennas are not located close to the streets and highways where an RTU will pass close by. These few receivers have a small chance of any problem, since the vehicle will quickly move away, and the RTU has a small chance of even transmitting while near the receiver, due to low transmit duty cycle of polled operation. In weaker TV signal areas, it is reasonable to assume the viewers will buy and install better, high-gain antennas. These antennas will substantially reduce the chance of interference. Because of the very directional nature of high-gain antennas, any undesired signals outside of the beam-width will be attenuated. Particularly behind a well designed antenna, the front-to-back ratio can make a large decrease in the required protection ratio.

Several remedies are available to eliminate any interference that may occur, possibly at the fringes of the B Grade contour. Once any problems with the viewers antenna or receiver are eliminated, simple filters will be attached to the receiver terminals and easily tuned to notch the 218-219 MHz signal. Alternate solutions are also available, such as better TV antennas or better antenna location.

It should be pointed out, that a very large percentage of the TV receivers in the Norfolk area are connected to Cable service or satellite receivers. This is a necessity in many areas due to the large military presence Hampton Roads, and all the associated electronic signals. Close to the center of the various cities, many powerful VHF transmitters are operated by Public Service, pager, VHF mobile, and many other radio services. Obviously, RTU interference is not possible for receivers not connected to antennas.

In summary: Calculations indicate that signal levels associated with RTU mobile operation will not cause significant interference. No noticeable interference was observed when RTUs where transmitting at 1 watt or less with no duty cycle in the near vicinity to a TV receiver. Mobile and cell operation, including output power control, will result in very short duration of any conditions that may possibly be a problem. Remedies, such as filters and antenna changes, will be applied to any unusual cases.

Appendix A

The grade B contour is -59dBμ or 631 μV/meter
calculating the received power, for a dipole antenna, typically rabbit ears:

$V=\sqrt{120\cdot\pi\cdot P}$ watts per meter squared to Volts/meter

$P:=\frac{(631\cdot10^{-6})^2}{120\cdot\pi}$ $P = 1.056\cdot10^{-9}$ Watts / m2 Grade B

Pr = receiver terminal power: = power density, P times antenna effective area

for rabbit ears:

$Arearcv=\frac{1.64\cdot\lambda^2}{4\cdot\pi}$ $Adip:=\frac{1.64\cdot\lambda^2}{4\cdot\pi}$ $Adip = 0.246$ $\lambda = 1.373$

$Pr := 10\cdot\log\left(P\cdot\frac{1.64\cdot\lambda^2}{4\cdot\pi}\cdot\frac{1}{10^{-3}}\right)$ $Pr = -65.853$ dBm

For the RTU: 1 W to 1/4 wave Vertical antenna 80% efficiency. At a distance of 100 meters

$Pr=\frac{P_t\cdot G_t\cdot G_r\cdot\lambda^2}{16\cdot\pi^2\cdot d^2}$

Received power Pr
Transmitted power * efficiency Pt
Gt and Gr are antenna gains (rations, = 1.64 for dipoles)
λ is wavelength
d is distance in meters
Cpol cross polarization affect, use 10 dB

$Prtu=10\cdot\log\left(\frac{Pr}{1\cdot mW}\right)-Cpol$ $Cpol := 10$

$Prtu(d) := 10\cdot\log\left[\frac{.6\cdot1.64\cdot1.64\cdot(1.373)^2}{16\cdot\pi^2\cdot d^2}\cdot\frac{1}{10^{-3}}\right]-Cpol$ $Prtu(100) = -37.152$

$Pr - Prtu(100) = -28.701$